used to characterize changes in gel **509** that accommodate the changes of tissue **529**. This might also be accomplished by printing regular structures, for example, but not limited to, Moire patterns, in gel **509**. Small changes in the location or size of these structures can be detectable and translatable into descriptions of the size and shape of tissue **529**. Gel **509** can include a fluidic medium.

[0180] Continuing to refer to FIG. **11**C, various imaging techniques can monitor cell growth and tissue development. In some configurations, magnetic resonance imaging (MRI) can apply a magnetic field to the tissue in order to align the protons with that field. Subsequent use of a radiofrequency current can cause the protons to strain against the magnetic field. When the radiofrequency current is turned off, the protons can realign with the magnetic field, and a sensing device can detect the energy released. MRI can provide contrast between different soft tissues without using exogenous contrast agents. In some configurations, MRI has a spatial resolution of about 100 μm. Bioluminescence imaging can monitor light emitted in enzyme-catalyzed reactions using a specific enzyme and substrate pairing such as luciferase and luciferin. Bioluminescence imaging requires transfection of certain cells with a luciferase reporter gene. The enzyme luciferase can oxidize its substrate luciferin in the presence of oxygen and ATP to release photons. A sensing device can capture the photonic release and can determine the number of viable cells present in the sample. Raman spectroscopy can measure light scattering and molecular vibrations at a spatial resolution of about 1 μm. Raman spectroscopy focuses a laser on a sample, causing an energy exchange between the laser and the sample molecules. The energy exchange can lead to a shift in the laser's wavelength that can create a spectrum that is unique and identifiable as to the biochemical composition and cellular structure of the sample. Two-photon fluorescence light microscopy can enable three-dimensional imaging of a biological specimen by using two-photon excitation. Two-photon excitation includes exciting a fluorophore with near-infrared light while simultaneously absorbing two photons. Both the two photon absorption and near-infrared light help can suppress background signal. A phased array can utilize a plurality of radiating elements to electronically move a beam of radio waves in various directions. The movement of the beam of radio waves can enable the phased array to change directions without physically moving the antennas. The data obtained from the plurality of phased arrays can create an image that can include a slice perspective through the sample. Sensors embedded within the bioreactor can detect information that can be used to determine when growing cells need more or different nutrients.

[0181] Continuing to refer to FIG. **11**C, precisely printing biological material can include providing laminar streams of bio-inks under conditions that inhibit mixing of the bio-inks. For example, a number of reasonably sized tubes can be placed in a nozzle that can be used to provide bio-ink to a printing device. The tubes can maintain laminar flow in the streams. The size of the tubes can be continually reduced so that a small nozzle at the termination of the printing device includes all the different bio-inks. Choosing appropriate bio-inks can include, for example, if optical sensing technology is being used, choosing materials that include indices of refraction that differ from the background in which the bio-ink is printed. In some configurations, air or any kind of gas can be appropriate, and multiple different types of gases can be printed to accommodate variations in fluorescence. Quantum dots and nanoparticle/fluorescent beads can be printed as probes/markers. Entire additional structures that may support tissue generation may be printed along with cells that can ultimately grow into tissue **529**, or that can accompany tissue **529** to, for example, monitor and/or sustain tissue **529**. The additional structures can be placed in a tissue enclosure after being printed, for example, but not limited to, any of the tissue enclosures described herein. The additional structures can include, but are not limited to including, photodetectors, silicon or other semi-conductors, electronics, and sensors that can be collocated with tissue **529**. Feedback on growth and topology of tissue **529** can be accommodated by, for example, printing and/or placing grid patterns/optical gratings in the vicinity of the inside and/or outside of tissue **529** and monitoring the contours of tissue **529**. Marker patterns can be placed around tissue **529** by depositing ink into media or by cutting out bits of gel. In some configurations, photodetectors can be placed in the gel and can be powered by connecting leads and/or inductive coupling that can power the photodetectors without leads.

[0182] Referring now to FIGS. **12**A, **12**B, and **12**C, precisely printing biological material can include guiding the streams of biological material by various means, including, but not limited to including, electrospinning. Electrospinning is a technique in which high voltage is applied to droplets, the energized droplets being stretched into fiber **1081**P, and fiber **1081**P being shaped on a grounded flat surface such as collection plate **1081**S (FIG. **12**A), or onto a three-dimensional shape **1081**HH (FIG. **12**C). Split ring resonators, or tank circuits, can be used to receive and shape the charge applied to the droplets. Array **1081**D of split ring resonators **1081**A and antennas **1081**B can be positioned around nozzle **1081**V in which the electrospinning technique is employed. Array **1081**D can be attached, for example, to a strip that can be mounted upon ring **1081**Y. In some configurations, antennas **1081**B and resonators **1081**A can be attached to opposite sides of the strip. Nozzle **1081**V can include an optional nipple that can modify the geometry of stream **1081**P according to the geometry of the nipple. Nozzle **1081**V can receive the biological material from material well **1081**C. High voltage system **1081**DD can supply voltage such as, for example, but not limited to, +10-50 kV to material well **1081**C, and therefore to nozzle **1081**V. Optional guides **1081**F (FIG. **12**B) can fine-tune the ultimate location of stream **1081**P by focusing the energy into a specific area. Emitter array **1081**D can include any number of resonators **1081**A and antennas **1081**B, and can direct/orient streams destined for collector array **1081**E. The deposition locations of the streams of thin fiber of bio-ink source **1081**Z can be based on the physical placement of resonators **1081**A, and the feedback control of resonators **1081**A. Collector array **1081**E and guides **1081**F can generate a raster-like deposition of stream **1081**P. Collection ring **1081**FF and collection array **1081**E can optionally be replaced by collection plate **10815**. Distance **1081**M1/**1081**M2, either between array **1081**D and collection ring **1081**FF, collection array **1081**E, or between array **1081**D and collection plate **10815**, can be chosen based on the desired characteristics of shaped fiber. In some configurations, guides **1081**F, integral with collector ring **1081**FF, can be used to direct stream **1081**P into substantially preselected locations within, for example, tissue. Thus, guides **1081**F can enable the electrospinning device to repair tissue